

Memorandum for record

OV-105 Radiography Observations

Dr. Ron Beshears

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Dr. Ron Beshears and Mr. Rickey Clements of ED32 traveled to KSC on August 29, 2002 to review final radiographs of repair welds on the OV-105 flow liner. This review was performed at the request of Dr. Paul Munafo after Dr. Beshears and Mr. Clements reviewed OV-105 repair radiographs that were exposed prior to final weld processing and detected crack indications on one weld (engine 2, slot 16) and very dark linear indications on the other weld (engine 1, slot 17).

Review of the final weld radiographs resulted in the following findings:

Engine 2, slot 16 repair weld

1. The crack indication that was initially observed on the intermediate radiographs was more clearly defined in the lightest (lowest radiographic density) film exposed after final weld processing. The initial crack indication appeared on the final film to originate from a broader, gray band on the weld bead that corresponded to the visible location of a lapped region on the weld bead surface. The indication on the final film was measured as approximately 0.045" long, located approximately 0.070" from the slot radius.
2. Two other crack indications visible on the lightest final film were not evident on the preliminary film (which was of higher radiographic density). One of these indications appeared to be connected to and possibly originating from the crack indication described in item 1 above. The other originated from the lapped region described above.
3. Other small, in-family crack indications at the slot radius were noted.
4. Dark areas surrounding the weld bead indicated that the base metal adjacent to the bead was polished to thickness below nominal base metal thickness.

Engine 1, slot 17 repair weld

1. Dark linear indications that were detected on the intermediate film were not visible on the final weld film.
2. Small, in-family crack indications at the slot radius were noted.
3. Dark areas surrounding the weld bead indicated that the base metal adjacent to the bead was polished to thickness below nominal base metal thickness.

USA engineering personnel advised that the indications on Engine 2, slot 16 were documented and dispositioned on a USA Problem Report (PR) per standard operating procedure. The crack indications were noted as failing acceptance criteria for radiographic inspection, but were accepted on the PR on the basis of ultrasonic testing data that indicated a 45% strength signal in the weld bead in the vicinity of the radiographic indications. USA personnel also indicated that NASA KSC Quality was not involved in this disposition ("nonexistent" was the word used by Mr. Rick Russell, USA

NDE lead for the flowliner project, to describe the participation of KSC quality in PR disposition). Dr. Beshears and Mr. Clements recommended to Dr. Munafo that more NASA KSC Quality involvement in disposition of PRs would ensure a more robust materials review board process for assessment of these and future inspection issues.

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